



**Barcelona  
Supercomputing  
Center**

*Centro Nacional de Supercomputación*



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# EARTH SCIENCE DEPARTMENT

**Scott Power**

Bureau of Meteorology of Australia

*Services – Earth Science Department*



- Created in 2005; 350 employees
- Research, develop and manage information technology
- Facilitate scientific progress and its application in society

## Earth Science Department










- **Atmospheric composition modelling**
- **Climate prediction modelling**
- **Computational Earth Sciences**
- **Earth Sciences Services**



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 Gabriela Tarabanoff

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## Computational Earth Sciences

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## Climate Prediction

## Earth System Services

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Maria Goncalves   
 Marc Guevara  
Vicenzo Obiso   
 Michele Spada  
Maria Teresa Pay   
 Victor Valverde   
Lluís Vendrell 

## Atmospheric Composition



# National and International collaborations



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Agència d'Ecologia Urbana de Barcelona



**Generalitat de Catalunya**



## OUR OBJECTIVE:

Facilitate technology transfer of state-of-the-art research from local, national to international levels in five areas:

Air quality assessments

Mineral Dust modelling

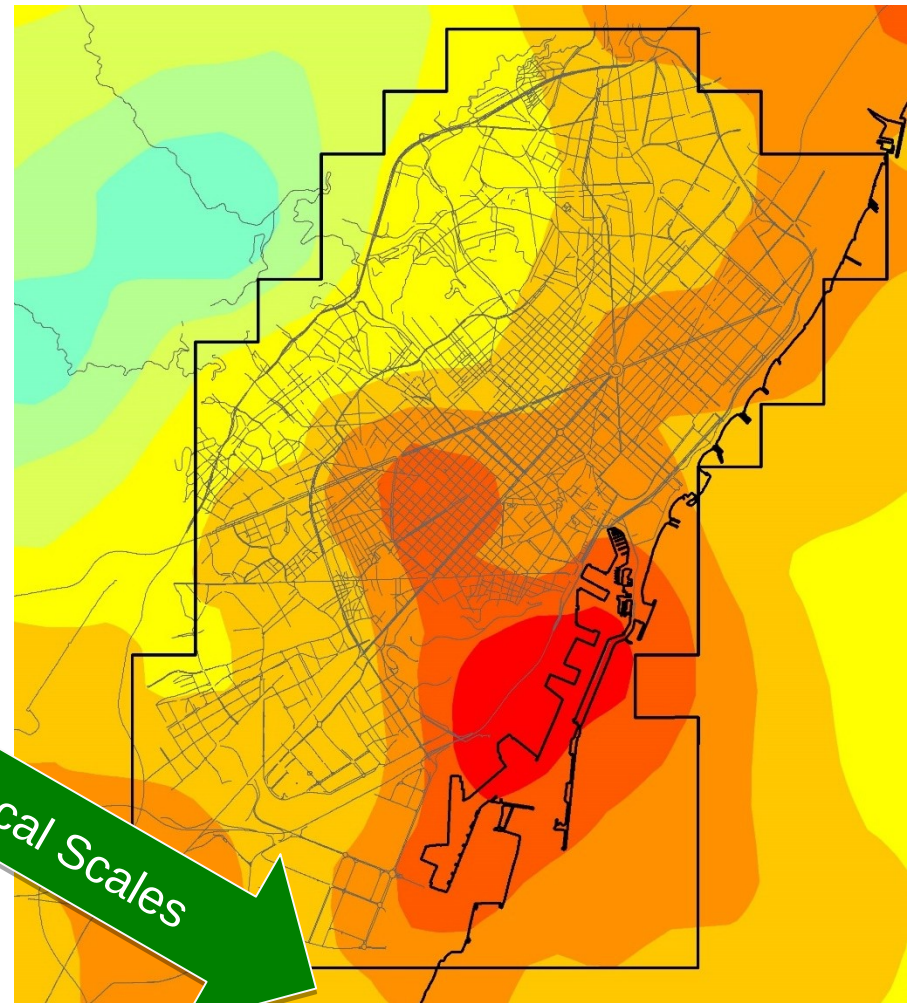
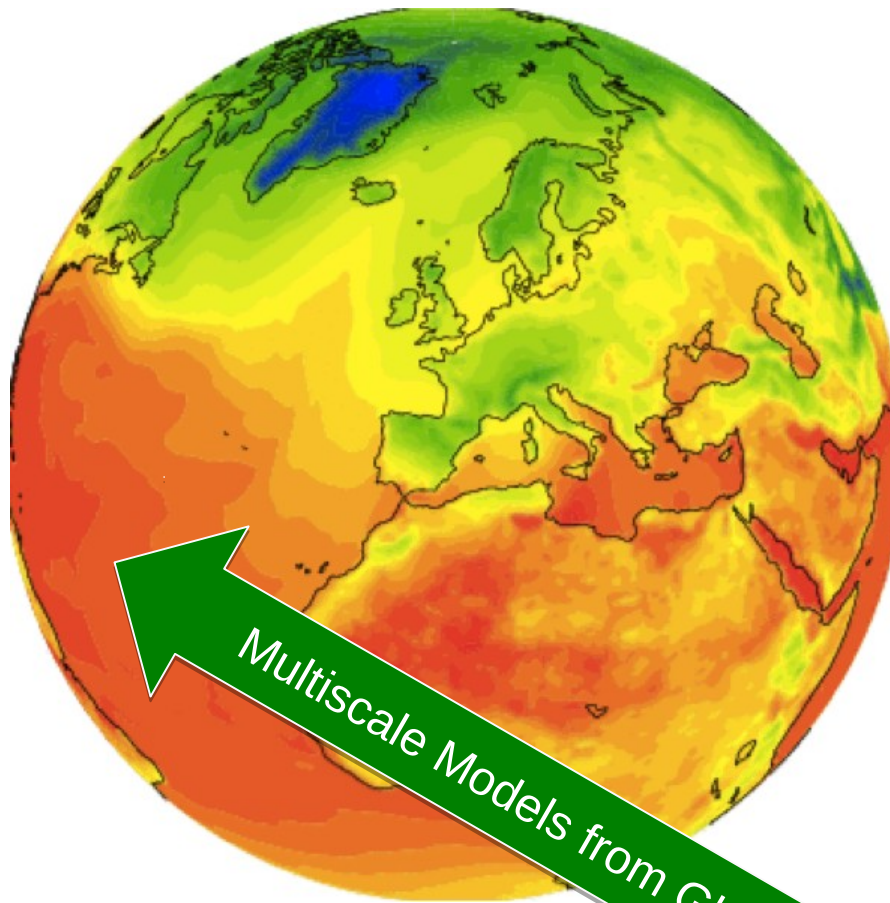
Weather forecasting

Climate predictions

Computational Earth Services

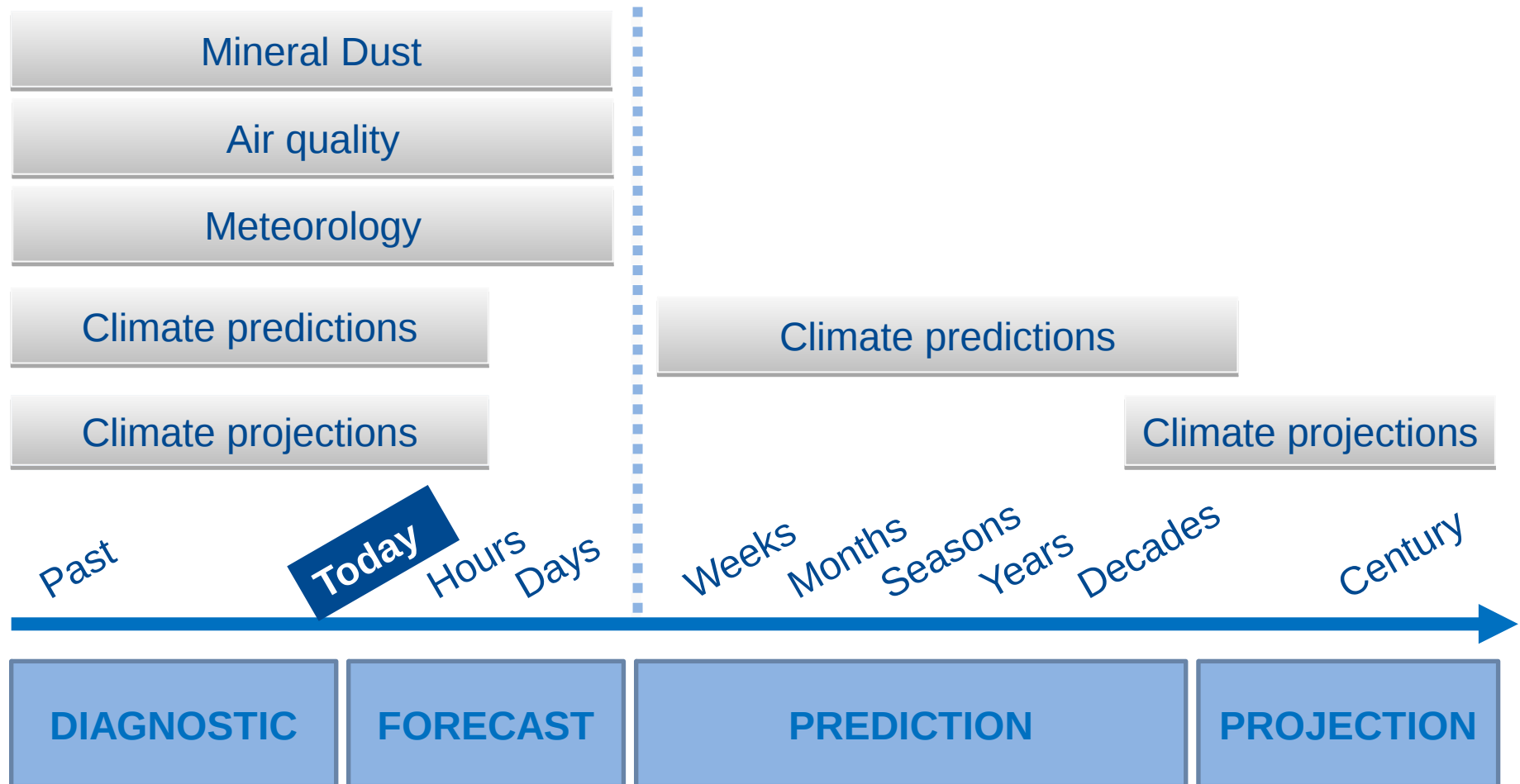


## Multi-scale models from global to local scales



Multiscale Models from Global to Local Scales

# Temporal scales



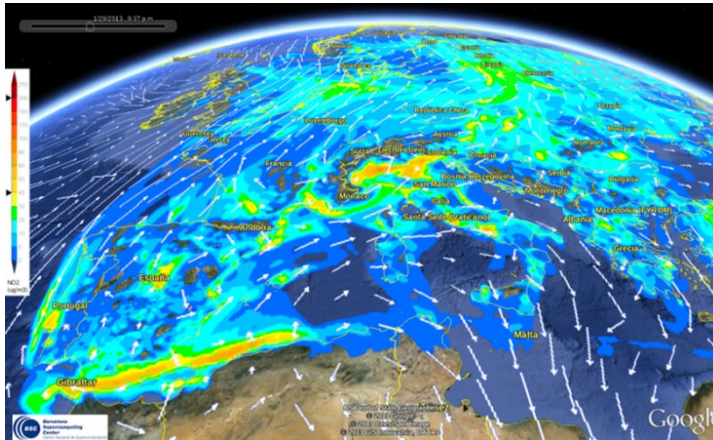


# Earth System Services



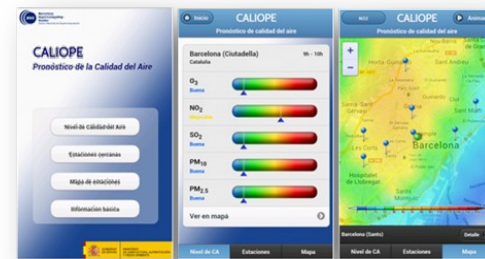
## Air quality forecast: CALIOPE

Provides air quality related information for the coming days and for the application of short term action plans for air quality managers.



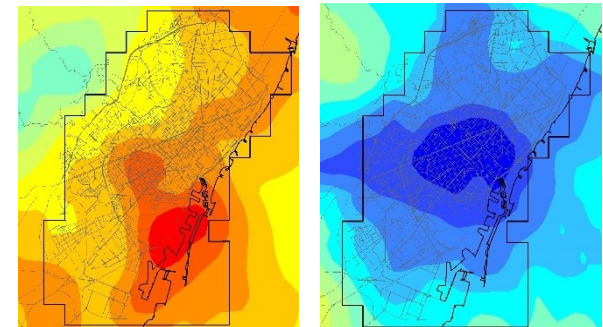
Information is delivered using both online or custom applications:

[www.bsc.es/caliope](http://www.bsc.es/caliope)



## Air quality impact assessment

Air quality modelling provides comprehensive description of air quality problems by relating emission sources and atmospheric conditions

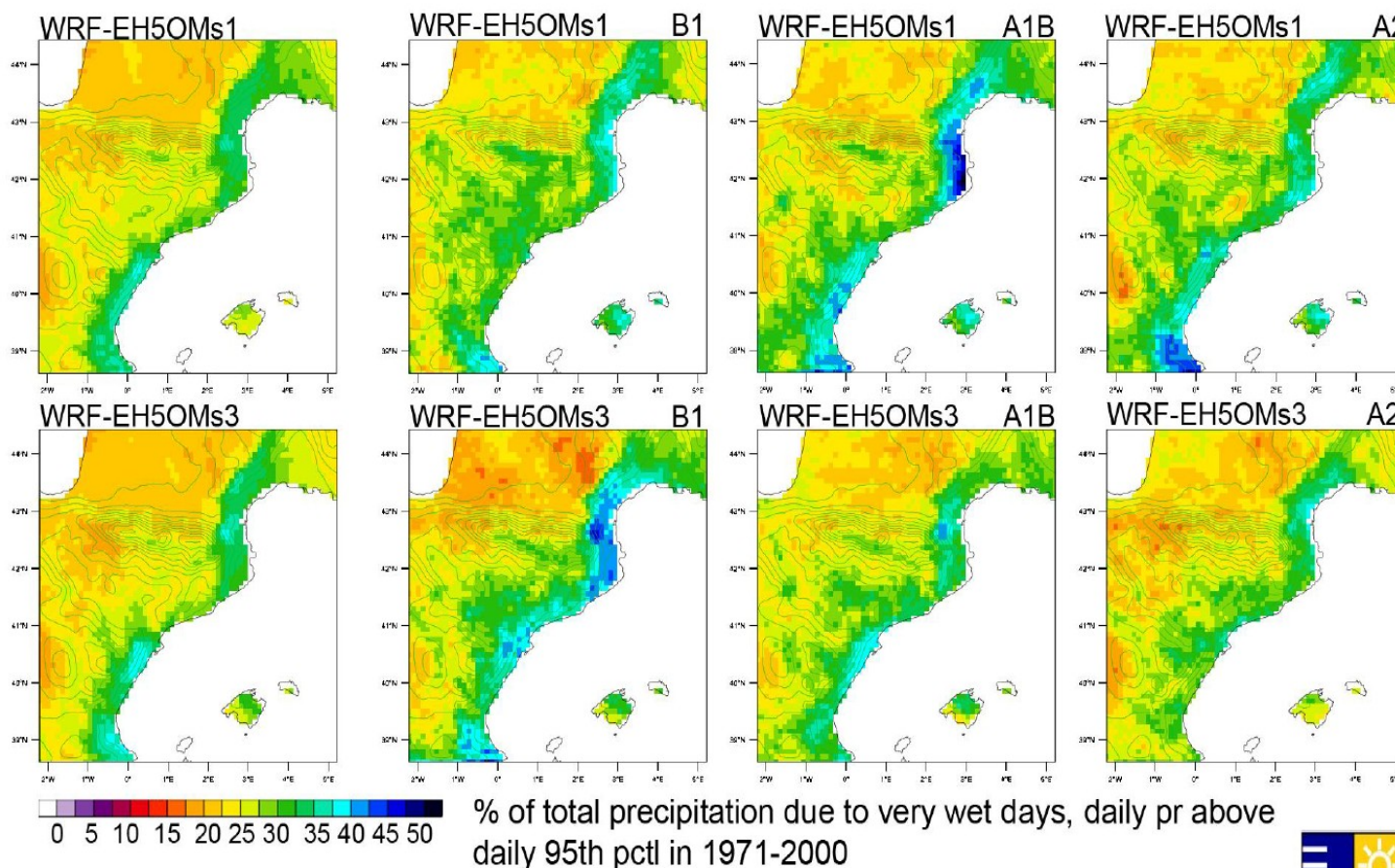


Left: NO<sub>2</sub> maximum h values in Barcelona (red >200 µg/m<sup>3</sup>)  
Right: Reductions due to fleet electrification (blue >25 µg/m<sup>3</sup>)

These projects have received funding from:

## Dynamical downscaling of climatic temperature and precipitation trends

This work aims to provide an assessment of temperature and precipitation projections for mid-21st century in the North Western Mediterranean Basin (NWMB) at high resolution.



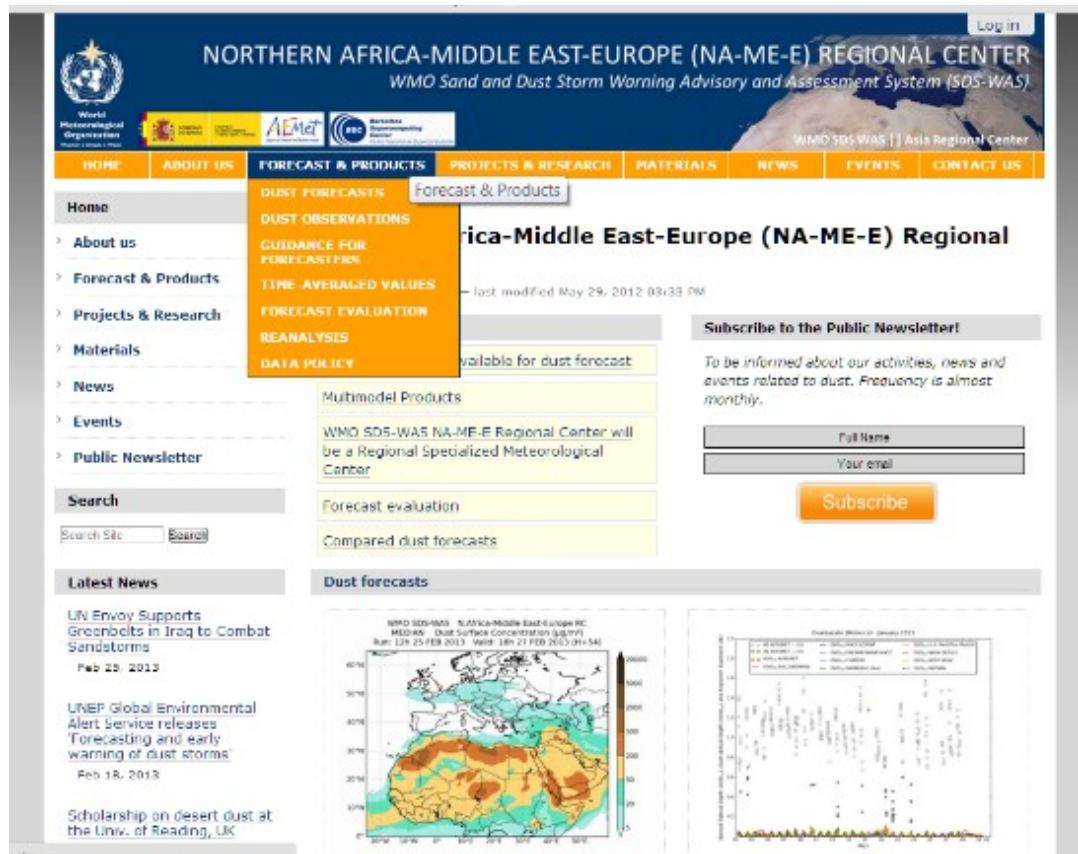


## Mineral dust forecasts SDS-WAS

## North Africa, Middle East and Europe Regional Center

## Early warning system

<http://sds-was.aemet.es>



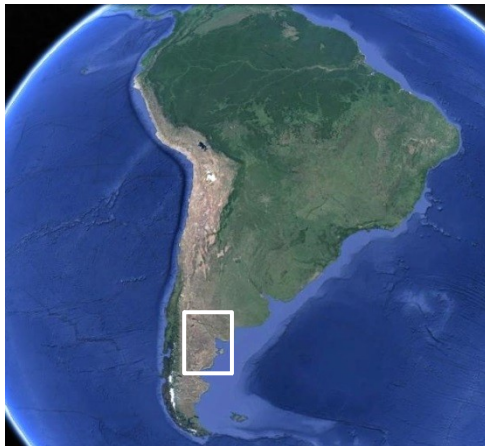
# Planning of vineyards fields



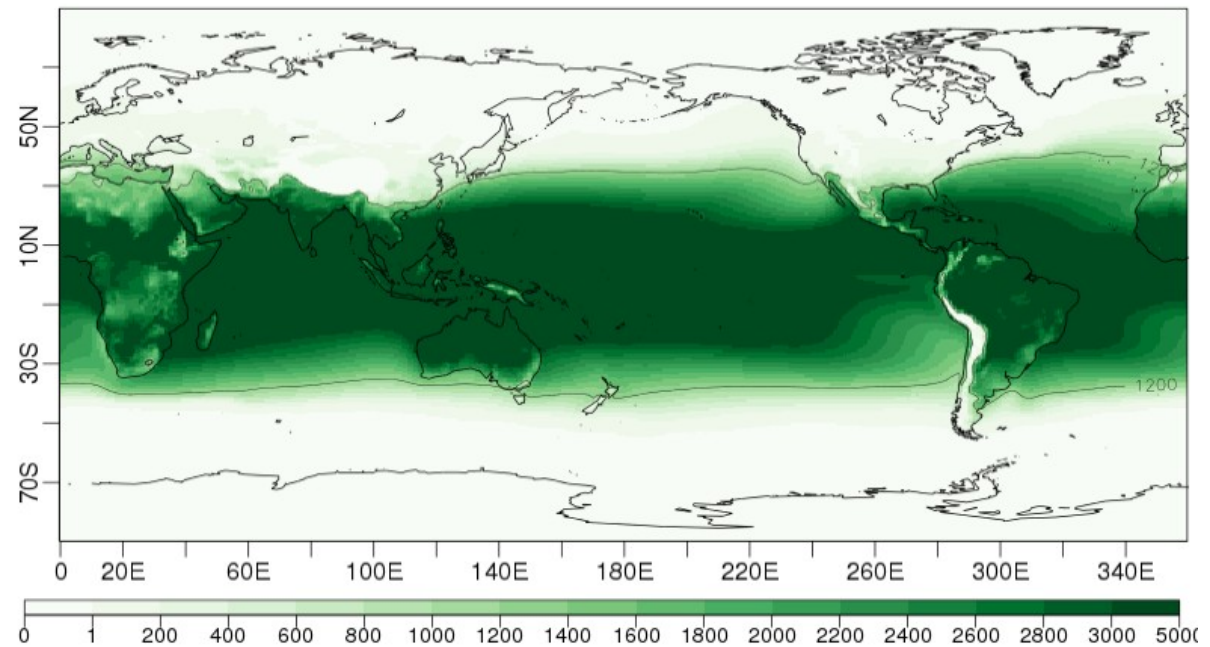
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## TORRES®



Winkler Index: Oct-Abr



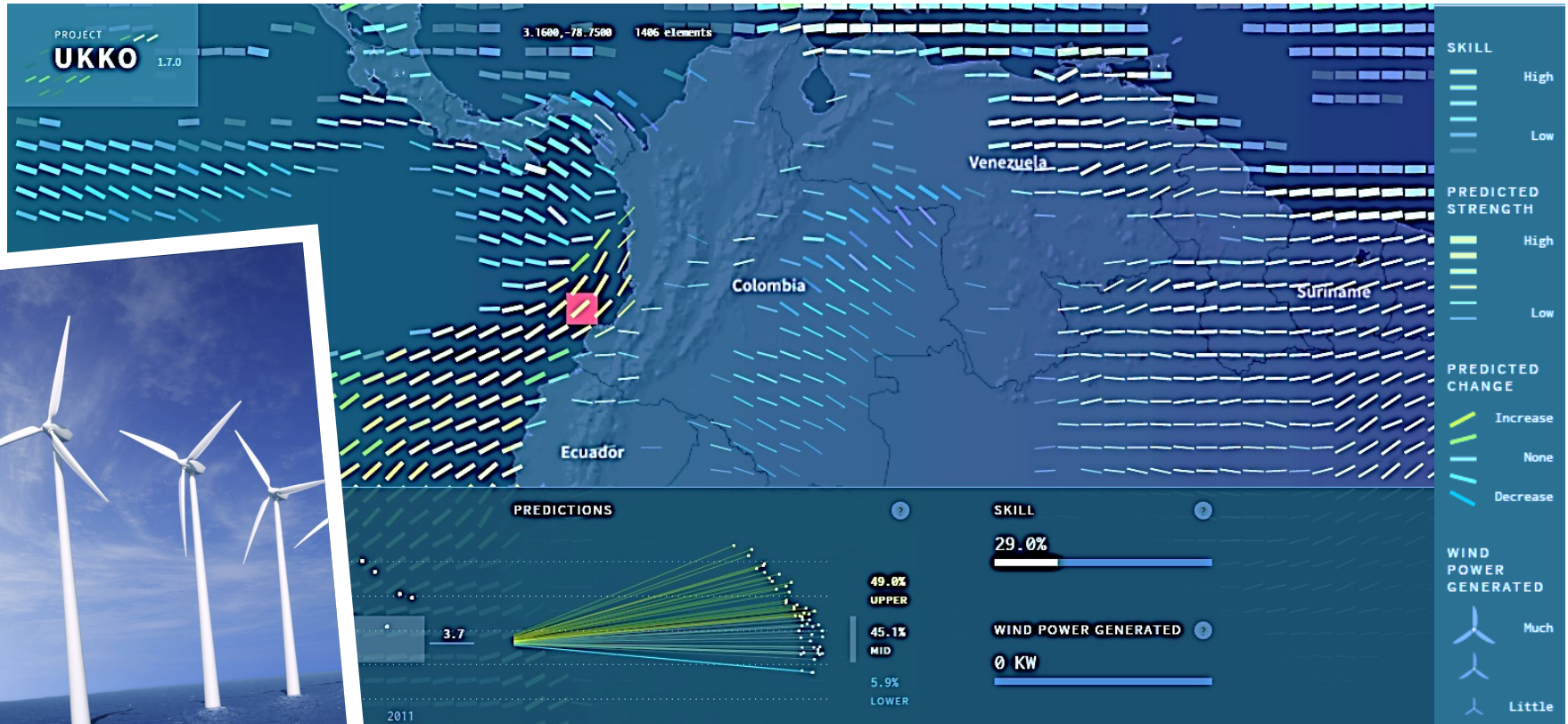


# Seasonal wind speed predictions



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**RESILIENCE**  
PROTOTYPE



EUPORIAS



ALSTOM



EnBW





**IMPRESX (Horizon 2020).**  
(Improving predictions and  
management of hydrological  
extremes)

## Potential applications in FLOOD RISK - WATER SUPPLY

- **Sub-seasonal** predictions (one month ahead)
  - **Seasonal** predictions (the season ahead)
    - General trends for precipitation, Temperature, etc.
  - **Downscaling** of climate variables.
- 
- Informing Hydroelectric power management
  - Early warning systems for extreme events
  - Information on drought periods or flood risk



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# Thank you!

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